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09/973,757	10/11/2001	Masatake Tamaru	VX012372	7173

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EXAMINER	
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ART UNIT	PAPER NUMBER
3623	

DATE MAILED: 12/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/973,757	TAMARU, MASATAKE	
	Examiner	Art Unit	
	Peter Choi	3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 October 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/16/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The following is a first office action upon examination of application number 09/973757. Claims 1 – 32 are pending in the application and have been examined on the merits discussed below.

Abstract

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because the abstract is greater than 150 words. Furthermore, legal phraseology such as “said” and “means” is frequently used in the disclosure. The explanation of different features and embodiments of the claimed invention are presented in claim formatting (see at least page 13, line 14 – page 14, line 14). Correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors. Specifically, see claim 19. For purposes of an art rejection, the limitation "displaying information toward outside of work site where said plurality of work machines is operating is installed in the periphery of said work site" has been interpreted to read "displaying information regarding a work site where said plurality of work machines are operating is installed in the periphery of said work site".

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-16 and 19-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Melby et al. (U.S Patent 6,952,680).

As per claim 1, Melby et al. teaches a work machine management system for work machines that perform prescribed work by operation of a plurality of work machines, wherein:

(a) said plurality of work machines **(assets 11 – a plurality of pieces of movable industrial equipment; forklifts 31)** is connected by first communication means **(each of the forklifts 31 is further provided with a transmitter 33 or other communications system for transmitting the acquired data from the data acquisition device 32 to the remote analysis system 50 for analysis)** so as to make reciprocal communications possible **(transmitter 33 is preferably embodied as a wireless communications system, such as represented by an antenna 34; the transmitters 33 and the wireless communications systems 34 can be embodied as conventional radio frequency transmitters provided on each of the forklifts 31 that transmit electromagnetic signals; wireless communications systems 34 are adapted to transmit signals that are representative of the sense operating conditions of the forklifts 31 through space to a receiver 35; the data acquisition units 32 and the receivers 35 are in bi-directional communication with one another)** [Column 3, lines 55-57, Column 7, lines 5-8, 14-27, 38-39];

(b) one or a plurality of main work machines **(local controller 36 that is adapted to receive and store data from each of the receivers 35 and to periodically transmit gathered and stored information regarding the individual operating characteristics to the remote analysis system 50 for analysis)** out of said plurality of work machines, and a server apparatus **(remote analysis system 50)** are connected by second communication means **(modem 52 or similar communications device; conventional modem 37 or other communications device; electronic communications network, such as the internet 40)** so as to make reciprocal communications possible [Column 7, lines 62-67, Column 8, lines 23-30, 48-52];

(c) each of said plurality of work machines is provided with work machine information detection means **(data acquisition device 32 is provided on each of the forklifts 31 for sensing and storing one or more characteristics of the associated forklift)** for detecting work machine information **(operational characteristics of the particular asset 11 being tracked, such as the physical requirements or limitations of the asset (mast height, load capacity, types of tires, for example), the type of fuel used, and the period of time or usage between the performance of periodic maintenance; time duration of use (and non-use), distances traveled, the extent of fork usage, the nature of hydraulic system utilization, and the like)** [Column 4, lines 34-44, Column 6, lines 48-50, 52-63];

(d) a database **(analysis controller database 78)** for storing data for managing said plurality of work machines **(real-time and historical information; maintenance information performed {step 82})**, and management information

production means for production management information **(determine that further preventative maintenance is required)** based on said work machine information and on data stored in said database, are provided at said server apparatus end [Column 12, lines 18-19, 56-57];

(e) in conjunction with work progress of said plurality of work machines, work machine information is detected by said work machine information detection means provided in said plurality of work machines and the work machine information so detected is transmitted to said main work machine or machines **(each of the forklifts 31 is further provided with a transmitter 33 or other communications system for transmitting the acquired data from the data acquisition device 32 to the remote analysis system 50 for analysis)** through said first communication means [Column 7, lines 5-8, 14-27, 38-39];

(f) said main work machine or machines transmit said transmitted work machine information to said server apparatus **(remote analysis system 50)** through said second communication means **(each of the forklifts 31 is further provided with a transmitter 33 or other communications system for transmitting the acquired data from the data acquisition device 32 to the remote analysis system 50 for analysis)** [Column 7, lines 5-8, 14-27, 38-39];

(g) said server apparatus **(remote analysis system 50)** produces management information **(automatically generate maintenance and warranty reports in response to received information regarding assets 31; automatically generate and analyze management reports relating to the procurement and**

utilization of a plurality of the forklifts 31) based on said transmitted work machine information and on data stored in said database **(real-time and historical information; determine that further preventative maintenance is required)**, and transmits the management information so produced to said main work machine or machines through said second communication means **(all of the reports generated are automatically delivered through the Internet 40)** [Column 6, lines 60-63, Column 15, lines 30-41]; and

(h) said main work machine or machines manage said plurality of work machines based on said transmitted management information **(management report can advise the person or entity that owns or operates the asset 31; carrying out said work order to maintain the asset)** [Column 11, lines 42-44; Claim 9].

As per claim 2, Melby et al. does not explicitly teach the work machine management system according to claim 1, wherein management information transmitted from said server apparatus to said main work machine or machines is displayed on a display device provided in said main work machine or machines.

However, Melby et al. provides for work order 166 to be transmitted electronically to a handheld device 168 associated with specific maintenance personnel assigned to carry out the maintenance [Column 17, lines 21-30]. Said handheld devices must inherently contain a display monitor to carry out said work orders. Further, prior art system allow for such information to be transmitted to the instrument panel or console of

work machine using communication means that are old and well known in the art (such as wireless communications system 34, modem 37 or 52, electronic communications network, Internet 40). Thus, the limitation of the claim is met.

As per claim 3, Melby et al. does not explicitly teach the work machine management system according to claim 1, wherein said prescribed work consists of a plurality of work processes; and said main work machine is determined for each of those work processes.

However, it is inherent that each work machine has a plurality of work processes specific to said work machine (for example, a delivery truck is unable to bulldoze land or perform demolition work, and vice versa) and that each work process requires the abilities of predetermined specific work machines.

As per claim 4, Melby et al. teaches the work machine management system according to claim 1, wherein management information produced by said server apparatus and transmitted to said main work machine or machines is information relating to maintenance that should be performed on any of said plurality of work machines **(Once it is determined that maintenance of some type is required based on an analysis of the operational status of asset 31, a maintenance report is generated and made available electronically by the Internet)** [Column 16, lines 26-30].

As per claim 5, Melby et al. teaches the work machine management system according to claim 1, wherein management information produced by said server apparatus and transmitted to said main work machine or machines is information relating to a trouble that has occurred in any of said plurality of work machines **(fault code may be generated based on the actions of the asset operator)** [Column 16, lines 6-7].

As per claim 6, Melby et al. teaches a work machine management system for work machines that perform prescribed work by operation of a plurality of work machines in accordance with a schedule work plan, wherein:

(a) said plurality of work machines is connected by first communication means so as to make reciprocal communications possible [see discussion of claim 1(a) above];

(b) one or a plurality of main work machines out of said plurality of work machines, and a server apparatus are connected by second communication means so as to make reciprocal communications possible [see discussion of claim 1(b) above];

(c) each of said plurality of work machines is provided with work machine information detection means for detecting work machine information [see discussion of claim 1(c) above];

(d) a database **(analysis controller database 78)** for storing data for managing said plurality of work machines **(real-time and historical information;**

maintenance information performed {step 82}), and scheduled work plan production means for producing a schedule work plan **(work order 166)** based on said work machine information data and on data stored in said database, are provided at said server apparatus end [Column 12, lines 18-19, 56-57];

(e) in conjunction with work progress of said plurality of work machines, work machine information is detected by said work machine information detection means provided in said plurality of work machines, and the work machine information so detected is transmitted to said main work machine or machines through said first communication means [see discussion of claim 1(e) above];

(f) said main work machine or machines transmit said transmitted work machine information to said server apparatus through said second communication means [see discussion of claim 1(f) above];

(g) said server apparatus produces a scheduled work plan **(work order 166)**, based on said transmitted work machine information and on data stored in said database, and transmits that scheduled work plan so produced to said main work machine or machines through said second communication means **(work order 166 is sent electronically to appropriate maintenance personnel that contains all of the critical operating data required to effectively schedule and carry out the maintenance)** [Column 17 lines 5-9]; and

(h) said work machine or machines manage said plurality of work machines based on said transmitted schedule work plan [see discussion of claim 1(h) above].

As per claim 7, Melby et al. does not explicitly teach the work machine management system according to claim 6, wherein scheduled work plan transmitted from said server apparatus to said main work machine or machines is displayed on a display device provided in said main work machine or machines.

However, Melby et al. provides for work order 166 to be transmitted electronically to a handheld device 168 associated with specific maintenance personnel assigned to carry out the maintenance [Column 17, lines 21-30]. Said handheld devices must inherently contain a display monitor to carry out said work orders. Further, prior art system allow for such information to be transmitted to the instrument panel or console of work machine using communication means that are old and well known in the art (such as wireless communications system 34, modem 37 or 52, electronic communications network, Internet 40). Thus, the limitation of the claim is met.

As per claim 8, Melby et al. does not explicitly teach the work machine management system according to claim 6, wherein said scheduled work plan comprises a plurality of work processes; and said main work machine is determined for each of those work processes.

However, it is inherent that work orders require more than a single task, and usually comprise a plurality of tasks and work processes, each work process requiring the abilities of predetermined specific work machines.

As per claim 9, Melby et al. teaches the work machine management system according to claim 6, wherein said server apparatus transmits information relating to maintenance that should be done to any of said plurality of work machines, and a scheduled work plan produced by revising current scheduled work plan in conjunction with the performance of maintenance **(work order 166 is sent electronically to appropriate maintenance personnel that contains all of the critical operating data required to effectively schedule and carry out the maintenance)**, to said main work machine or machines [Column 17, lines 5-9].

As per claim 10, Melby et al. teaches the work machine management system according to claim 6, wherein:

(a) a terminal apparatus **(handheld device 168)** provided on the end where maintenance is done on said plurality of work machines is also connected to said second communication means **(handheld device 168 is in real-time two way communication with analysis controller database 78)** [Column 17, lines 25-27];

(b) said server apparatus transmits information relating to maintenance that should be done to any of said plurality of work machines, and a revised scheduled work plan produced by revising current scheduled work plan in conjunction with the performance of maintenance, to said main work machine or machines **(work order 166 is transmitted electronically to a handheld device 168 associated with specific maintenance personnel assigned to carry out the maintenance; (work order 166 is**

sent electronically to appropriate maintenance personnel that contains all of the critical operating data required to effectively schedule and carry out the maintenance) [Column 17, lines 5-9, 21-27]; and

(c) said main work machine or machines transmit instructions for performing maintenance, based on the transmitted information relating to maintenance **(information concerning anticipated parts and the nearest location from where they may be retrieved based on information contained within the fault code or retrieved from the knowledgebase)**, to said maintenance terminal apparatus through said second communication means, and manage said plurality of work machines based on said revised scheduled work plan [Column 17, lines 12-16].

As per claim 11, Melby et al. teaches the work machine management system according to claim 6, wherein said server apparatus transmits information relating to troubles that have arisen in said plurality of work machines **(fault codes)**, and a revised scheduled work plan produced by revising current scheduled work plan in conjunction with occurrence of troubles **(work order 166 is sent electronically to appropriate maintenance personnel that contains all of the critical operating data required to effectively schedule and carry out the maintenance)**, to said main work machine or machines [Column 17 lines 5-9].

As per claim 12, Melby et al. teaches the work machine management system according to claim 6, wherein:

(a) a trouble correction terminal apparatus **(handheld device 168)** provided on the end where troubles with said plurality of work machines are corrected is also connected to said second communication means **(handheld device 168 is in real-time two way communication with analysis controller database 78)** [Column 17, lines 25-27];

(b) said server apparatus transmits information relating to troubles that have occurred in said plurality of work machines **(fault code)**, and a revised scheduled work plan produced by revising current scheduled work plan in conjunction with the trouble occurrence, to said main work machine or machines **(work order 166 is transmitted electronically to a handheld device 168 associated with specific maintenance personnel assigned to carry out the maintenance; work order 166 is sent electronically to appropriate maintenance personnel that contains all of the critical operating data required to effectively schedule and carry out the maintenance)** [Column 17, lines 5-9, 21-27]; and

(c) said main work machine or machines transmit instructions for correcting troubles, based on the information relating to troubles that was transmitted **(information concerning anticipated parts and the nearest location from where they may be retrieved based on information contained within the fault code or retrieved from the knowledgebase)**, to said trouble correction terminal apparatus through said second communication means, and manage said plurality of work machines based on said revised scheduled work plan [Column 17, lines 12-16].

As per claim 13, Melby et al. teaches the work machine management system according to claim 6, wherein said server apparatus stores in memory schedule and performance results data indicating relationship between a scheduled work plan produced in past and actual work performance results as performed on basis of said scheduled work plan **(determine whether a predetermined period of time has elapsed in order to generate a periodic management report covering some or all of the assets being tracked; real-time and historical information; maintenance information performed {step 82}; determine whether scheduled maintenance has been performed, and determining the party responsible for certain maintenance activities; information regarding maintenance performed is stored in database 78)**, and produces a new scheduled work plan based on said schedule and performance results data [Column 11, lines 64-66, Column 12, lines 18-19, 56-57].

As per claim 14, Melby et al. teaches a scheduled work plan production apparatus that, in cases where a scheduled work plan is produced according to work request data indicating particulars of work requested by an ordering party, and work is caused to be done, using a plurality of work machines, based on said produced scheduled work plan, produces said scheduled work plan, wherein:

(a) a database **(analysis controller database 78)** for storing schedule and performance results data indicating relationship between said scheduled work plan produced in past and actual work performance results as performed on basis of said scheduled work plan **(determine whether a predetermined period of time has**

elapsed in order to generate a periodic management report covering some or all of the assets being tracked; real-time and historical information; maintenance information performed {step 82}; determine whether scheduled maintenance has been performed, and determining the party responsible for certain maintenance activities) is provided **(information regarding maintenance performed is stored in database 78)** at a server apparatus end **(remote analysis system 50 {which is also connected to an electronic communications network})** [Column 11, lines 64-66, Column 12, lines 18-19, 56-57]

(b) a terminal apparatus **(handheld device 168)** on said ordering party end, said terminal apparatus and said plurality of work machines are connected by communication means so as to make reciprocal communications possible **(handheld device 168 is in real-time two way communication with analysis controller database 78)** [Column 17, lines 25-27];

(c) said work request data **(handheld device 168 is in real-time two way communication with analysis controller database, thus, dealer billing systems, inventory listings, customer work order approval records, fleet management information can be accessed by handheld device 168; handheld device 168 is used to update database 78 including labor information and an identification of any parts required to effect a repair)** are input from said terminal apparatus on said ordering party end [Column 17, lines 24-30, 35-38];

(d) said server apparatus produces a scheduled work plan based on input work request data and on schedule and performance results data stored in said

database, transmits said produced scheduled work plan to said plurality of work machines through said communication means, and updates said schedule and performance results data in said database **(work order 166 is transmitted electronically to a handheld device 168 associated with specific maintenance personnel assigned to carry out the maintenance; work order 166 is sent electronically to appropriate maintenance personnel that contains all of the critical operating data required to effectively schedule and carry out the maintenance; remote analysis system 50 automatically updates individual records associated with each of the assets with information {such as fault codes, maintenance problems, when routine maintenance is required} received from the Internet)** [Column 2, lines 55-57, Column 17, lines 5-9, 21-27];

(e) said plurality of work machines performs work based on transmitted scheduled work plan **(work order 166)** and transmits actual work performance results as performed on basis of said scheduled work plan to said server apparatus through said communication means **(carrying out said work order to maintain the asset)** [Claim 9]; and

(f) said server apparatus **(remote analysis system 50)** updates said database **(analysis controller database 78)** with said actual work performance results transmitted **(remote analysis system 50 automatically updates individual records associated with each of the assets with information {such as fault codes, maintenance problems, when routine maintenance is required} received from the Internet)** [Column 2, lines 55-57].

As per claim 15, Melby et al. teaches the scheduled work plan production apparatus according to claim 14, wherein:

(a) when revision data for revising a current scheduled work plan are given, said server apparatus revises current scheduled work plan based on those revision data, said work request data, and schedule and performance results data stored in said database **(handheld device 168 is used to update database 78, including labor information and an identification of any parts required to effect a repair)**, and transmits said revised scheduled work plan to said plurality of work machines through said communication means **(handheld device 168 is in real-time two way communication with analysis controller database)** [Column 2, lines 55-57, Column 17, lines 24-27, 35-38]; and

(b) said plurality of work machines performs work based on transmitted scheduled work plan **(carrying out said work order to maintain the asset)**, and transmits actual work performance results as performed on basis of said schedule work plan to said server apparatus by said communication means **(remote analysis system 50 automatically updates individual records associated with each of the assets with information {such as fault codes, maintenance problems, when routine maintenance is required} received from the Internet)** [Column 2, lines 55-57; Claim 9].

As per claim 16, Melby et al. teaches a scheduled work plan production apparatus that, in cases where a scheduled work plan is produced according to work request data indicating particulars of work requested by an ordering party, a plurality of work machines is obtained, and work is caused to be done using said plurality of work machines so obtained, based on said produced scheduled work plan, produces said scheduled work plan, wherein:

(a) a database for storing schedule and performance results data indicating relationship between scheduled work plan produced in past and actual work performance results as performed on basis of said scheduled work plan is provided at a server apparatus end [see analysis of claim 14(a) above];

(c) a terminal apparatus on said ordering party end, said server apparatus, and said plurality of work machines are connected by communication means so as to make reciprocal communications possible [see analysis of claim 14(b) above];

(d) said work request data are input from said terminal apparatus on said ordering party end [see analysis of claim 14(c) above];

(e) said server apparatus produces a scheduled work plan based on input work request data and on schedule and performance results data stored in said database, transmits said produced scheduled work plan to said plurality of work machines and to said rental/production end terminal apparatus through said communication means, and updates schedule and performance results data in said database [see analysis of claim 14(d) above];

(f) said plurality of work machines performs work based on transmitted scheduled work plan and transmits actual work performance results as performed on basis of said scheduled work plan to said server apparatus by said communication means [see analysis of claim 14(e) above];

(g) said server apparatus updates said database with actual work performance results transmitted [see analysis of claim 14(f) above]; and

Melby et al. does not explicitly teach the inclusion of a rental/production end terminal apparatus on a communication means. However, connecting data terminals to an electronic communications network, such as the Internet, is a step that is old and well known in the art. Furthermore, the step of connecting an additional terminal apparatus to the electronic communications network taught by Melby et al. can be performed in a similar fashion to the ordering party terminal, meeting the limitation of the claim.

Melby et al. does not explicitly teach:

(b) a rental/production end terminal apparatus for renting or producing said work machines is also provided; and

(h) said rental/production end terminal apparatus plans rental or production based on transmitted scheduled work plan.

However, handheld device 168 is in real-time two way communication with analysis controller database 78 and is enabled to update said database regarding required and scheduled maintenance. The system is further enabled to automatically order replacement parts. The need to rent or produce additional work machines may be based on information entered by the handheld device. Further, the system can be enabled to automatically order replacement/additional machines, in a fashion similar to ordering replacement parts. Said orders are propagated throughout the analysis system 50. The system provides for automatic generation of reports for required maintenance work, and can be enabled to generate order reports for required additional/replacement work machines. Therefore, handheld device 168 is capable of facilitating such actions, meeting the limitations of the claim.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the teachings of Melby et al. to include a terminal for renting/producing work machines because the resulting invention would enable the system to obtain additional resources, as needed, to provide an adequate number of work machines to perform prescribed work without suffering costly delays (time and financial, as resulting from a decreased number of available work machines, delaying the completion of said prescribed work).

As per claim 19, Melby et al. teaches the work machine management system according to claim 1, wherein:

(a) an information display for displaying information regarding a work site where said plurality of work machines are operating is installed in the periphery of said work site **(receiver 35 that is provided at a fixed location within the environment in which they are operated; receiver 35 may be provided on movable structures that move about the environment to receive the information transmitted thereon)** [Column 7, lines 24-37];

(b) said server apparatus produces information relating to said work site, based on work machine information that has been transmitted and on data stored in said database, and transmits said information relating to said work site so produced to said main work machine through said second communications means [see analysis of claim 1(g) above];

(c) said main work machine **(local controller 36)** displays said information relating to said work site so transmitted on said information display **(receiver 35 confirms the accuracy and completeness of information transmitted by data acquisition unit 32; local controller 36 is connected to receiver 35)** [Column 7, lines 38-53 and 62].

As per claim 20, Melby et al. teaches the work machine management system according to claim 19, wherein said main work machine causes transmitted information relating to said work site to be displayed on said information display installed in the periphery of said work site via said first communication means **(wireless communications system 34 is adapted to transmit signals that are representative**

of the sensed operating conditions of the forklifts 31 to a receiver 35 that is provided at a fixed location within the environment in which they are operated) [Column 7, lines 24-37].

As per claim 21, Melby et al. teaches the work machine management system according to claim 1, wherein:

(a) an information display for providing information toward outside of work site where said plurality of work machines is operating is installed in the periphery of said work site **(wireless communications system 34 is adapted to transmit signals that are representative of the sensed operating conditions of the forklifts 31 to a receiver 35 that is provided at a fixed location within the environment in which they are operated)** [Column 7, lines 24-37]; and

(b) said server apparatus **(remote analysis system 50)** produces information relating to said work site, **(automatically generate maintenance and warranty reports in response to received information regarding assets 31; automatically generate and analyze management reports relating to the procurement and utilization of a plurality of the forklifts 31)** based on work machine information that has been transmitted and on data stored in said database **(real-time and historical information; determine that further preventative maintenance is required)**, transmits said information relating to said work site so produced to said information display through second communication means, and causes said information relating to said work site so transmitted to be displayed on said information display **(receiver 35**

that is provided at a fixed location within the environment in which they are operated; receiver 35 may be provided on movable structures that move about the environment to receive the information transmitted thereon) [Column 7, lines 24-37].

As per claim 22, Melby et al. teaches a work machine management system of work machines that perform prescribed work by operation of a plurality of work machines inside a work site, comprising:

(a) environmental condition measurement means **(data acquisition device 32)** for measuring environmental conditions **(any desired operating conditions of the forklift 31 that might be considered important in making effective management decisions regarding the operation of the forklift 31; distances traveled)** in the periphery of a work site, provided in the periphery of said work site [Column 6, lines 48-63];

(b) an information display or displays for displaying information toward outside of a work site, installed in the periphery of said work site, or, alternatively, provided in one or more of said plurality of work machines **(wireless communications system 34 is adapted to transmit signals that are representative of the sensed operating conditions of the forklifts 31 to a receiver 35 that is provided at a fixed location within the environment in which they are operated; receiver 35 may be provided on movable structures that move about the environment to receive the information transmitted thereon)** [Column 7, lines 24-37];

(c) communication means for connecting said environmental condition measurement means with a server apparatus and connecting said server apparatus with said information display or displays, so as to make reciprocal communication possible **(each of the forklifts 31 is further provided with a transmitter 33 or other communications system for transmitting the acquired data from the data acquisition device 32 to the remote analysis system 50 for analysis)** [Column 7, lines 5-8, 14-27, 38-39];

(d) display information production means, provided at said server apparatus end, for producing environmental conditions display information based on measured environmental condition values and on data stored in a database **(receiver 35 that is provided at a fixed location within the environment in which they are operated; receiver 35 may be provided on movable structures that move about the environment to receive the information transmitted thereon** [Column 7, lines 24-37]; wherein

(e) measured environmental conditions values measured by said environmental condition measurement means, in conjunction with work progress of said plurality of work machines, are transmitted to said server apparatus through said communication means **(each of the forklifts 31 is further provided with a transmitter 33 or other communications system for transmitting the acquired data from the data acquisition device 32 to the remote analysis system 50 for analysis)** [Column 7, lines 5-8, 14-27, 38-39]; and

(f) said server apparatus produces environmental condition display information **(information relating to the operational characteristics of the asset 11 being tracked, or operating conditions of the forklift 31 that might be considered important in making effective management decisions regarding the operation of forklift 31)**, based on measured environmental conditions values so transmitted **{data provided by transmitter 33}** and on data stored in said database **(analysis controller database 78)**, transmits said environmental condition display information so produced to said information display through said communication means **(receiver 35 that is provided at a fixed location within the environment in which they are operated; receiver 35 may be provided on movable structures that move about the environment to receive the information transmitted thereon; receiver 35 is connected to local controller 36, which is connected to remote analysis system 50 by conventional modem 37 or electronic communications network, such as the Internet)**, and causes said environmental condition display information so transmitted to be displayed on said information display [Column 4, lines 34-44, Column 6, lines 52-63, Column 7, lines 24-37, 61-62, Column 8, lines 23-30].

As per claim 23, Melby et al. teaches the work machine management system according to claim 1, wherein data on performance results for work performed by said plurality of work machines are stored in said database **(analysis controller database 78)** in said server apparatus for each of said plurality of work machines **(real-time and historical information; maintenance information performed {step 82})**, and when

data requesting production of a work report relating to a specific work machine are transmitted from said main work machine to said server apparatus **(local controller 36 that is adapted to receive and store data from each of the receivers 35 and to periodically transmit gathered and stored information regarding the individual operating characteristics to the remote analysis system 50 for analysis)** through said second communication means **(modem 52 or similar communications device; conventional modem 37 or other communications device; electronic communications network, such as the internet 40)**, said server apparatus reads out work performance results data corresponding to said specific work machine from data recorded in said database, produces a work report indicating particulars of work performed in a certain time period by said specific work machine **()**, and transmits said second communication means, and said main work machine manages said plurality of work machines based on said work report so transmitted **(management report can advise the person or entity that owns or operates the asset 31; carrying out said work order to maintain the asset)** [Column 7, lines 62-67, Column 8, lines 23-30, 48-52, Column 11, lines 42-44, Column 12, lines 18-19, 56-57; Claim 9].

As per claim 24, Melby et al. teaches the work machine management system according to claim 23, wherein:

(a) a terminal apparatus for labor management **(handheld device 168)** provided on the end where labor management is performed for persons on board said plurality of construction machines **(handheld device 168 is associated with specific**

maintenance personnel assigned to carry out the maintenance) and said main work machine are connected by communication means to make reciprocal communications possible **(handheld device 168 is in real-time two way communication with analysis controller database 78)** [Column 17, lines 25-27];

(b) said main work machine transmits said work report to said terminal apparatus for labor management by said communication means **(work order 166 is transmitted electronically to a handheld device 168 associated with specific maintenance personnel assigned to carry out the maintenance; work order 166 is sent electronically to appropriate maintenance personnel that contains all of the critical operating data required to effectively schedule and carry out the maintenance)** [Column 17, lines 5-9, 21-27]; and

(c) said terminal apparatus for labor management performs labor management for those on board said plurality of construction machines based on said work report so transmitted **(information concerning anticipated parts and the nearest location from where they may be retrieved based on information contained within the fault code or retrieved from the knowledgebase; in response to a fault code, electronic checklist 154 is to be completed by asset operator on a regular basis in accordance with OSHA requirements)** [Column 17, lines 12-16].

As per claim 25, Melby et al. teaches the work machine management system according to claim 1, wherein:

(a) said work machine information is work condition information indicating actual work conditions of a work machine **(operational characteristics of the particular asset 11 being tracked, such as the physical requirements or limitations of the asset (mast height, load capacity, types of tires, for example), the type of fuel used, and the period of time or usage between the performance of periodic maintenance; time duration of use (and non-use), distances traveled, the extent of fork usage, the nature of hydraulic system utilization, and the like)** [Column 4, lines 34-44, Column 6,lines 48-63];

(b) data on schedule of work to be performed by said plurality of work machines **(maintenance invoice)** are stored in a database in said server apparatus **(maintenance organization 86 both receives and provides information to database 78;)**, for each of said plurality of work machines [Column 11, line 61 – Column 12, line 4, Column 12, lines 34-36] ;

(c) when said work condition information is transmitted from said main work machine to said server apparatus through said second communication means, said server apparatus reads out work schedule data from data stored in said database, compares those work schedule data and transmitted work condition information, and, when there is a discrepancy, produces anomaly information indicating that an anomaly has occurred in corresponding work machine **(automatically generate maintenance and warranty reports in response to received information regarding assets 31; automatically generate and analyze management reports relating to the procurement and utilization of a plurality of the forklifts 31)**, and transmits said

anomaly information so produced **(Once it is determined that maintenance of some type is required based on an analysis of the operational status of asset 31, a maintenance report is generated and made available electronically by the Internet)** to said main work machine through said second communication means **(fault code may be generated based on the actions of the asset operator)** [Column 6, lines 60-63, Column 15, lines 30-41, Column 16, lines 6-7, and lines 26-30]; and

(d) said main work machine manages said plurality of work machines based on said transmitted anomaly information **(management report can advise the person or entity that owns or operates the asset 31; carrying out said work order to maintain the asset)** [Column 11, lines 42-44; Claim 9].

As per claim 26, Melby et al. teaches the work machine management system according to claim 1, wherein:

(a) said work machine information is position information indicating actual position of a work machine **(operational characteristics of the particular asset 11 being tracked, such as the physical requirements or limitations of the asset (mast height, load capacity, types of tires, for example), the type of fuel used, and the period of time or usage between the performance of periodic maintenance; time duration of use (and non-use), distances traveled, the extent of fork usage, the nature of hydraulic system utilization, and the like)** [Column 4, lines 34-44, Column 6,lines 48-63];

(b) operating positions at which said plurality of work machines operates are stored in a database **(real-time and historical information stored in analysis controller database 78; maintenance information performed {step 82})** in said server apparatus [Column 12, lines 18-19, 56-57];

(c) when said position information is transmitted from said main work machine to said server apparatus through said second communication means, said server apparatus through said second communication means, said server apparatus reads out operating position data from data stored in said database, compares those operating position data and transmitted position information, and, when an actual position deviates from an operating position, produces anomaly information **(fault code may be generated based on the actions of the asset operator {such as incorrect/unscheduled operating position} changes in operational parameters associated with asset 31 may result in the generation of a specific fault code)** indicating that an anomaly has occurred in corresponding work machine, and transmits said anomaly information so produced to said main work machine by said second communication means [Column 15, lines 54-62, Column 16, lines 6-7]; and

(d) said main work machine manages said plurality of work machines based on said transmitted anomaly information **(management report can advise the person or entity that owns or operates the asset 31; carrying out said work order to maintain the asset)** [Column 11, lines 42-44; Claim 9].

As per claim 27, Melby et al. teaches the work machine management system according to claim 1, wherein:

(a) said work machine information is attitude information indicating actual attitude of a work machine **(operational characteristics of the particular asset 11 being tracked, such as the physical requirements or limitations of the asset (mast height, load capacity, types of tires, for example), the type of fuel used, and the period of time or usage between the performance of periodic maintenance; time duration of use (and non-use), distances traveled, the extent of fork usage, the nature of hydraulic system utilization, and the like)** [Column 4, lines 34-44, Column 6,lines 48-63];

(b) attitude limit values for said plurality of work machines are stored in a database in said server apparatus **(real-time and historical information stored in analysis controller database 78; maintenance information performed {step 82})** in said server apparatus [Column 12, lines 18-19, 56-57];

(c) when said attitude information is transmitted from said main work machine to said server apparatus through said second communication means, said server apparatus reads to attitude limit value data from data stored in said database, compares those attitude limit value data and transmitted attitude information, and, when an actual attitude exceeds an attitude limit value, produces anomaly information indicating that an anomaly has occurred in corresponding work machine **(fault code may be generated based on the actions of the asset operator {such as actual attitude exceeding attitude limit value}; changes in operational parameters associated with asset 31**

may result in the generation of a specific fault code), and transmits said anomaly information so produced to said main work machine through said second communication means [Column 15, lines 54-62, Column 16, lines 6-7]; and

(d) said main work machine manages said plurality of work machines based on said transmitted anomaly information **(management report can advise the person or entity that owns or operates the asset 31; carrying out said work order to maintain the asset)** [Column 11, lines 42-44; Claim 9].

As per claim 28, Melby et al. teaches the work machine management system according to any one of claims 25-27, wherein:

(a) an anomaly handling terminal apparatus **(handheld device 168)** provided on the end anomaly handing is performed for a construction machine where an anomaly has occurred, and said server apparatus are connected to by communication means to make reciprocal communications possible **(handheld device 168 is in real-time two way communication with analysis controller database 78)** [Column 17, lines 25-27];

(b) said server apparatus, when anomaly information has been produced by said server apparatus, transmits said anomaly information **(fault code)** to anomaly handling terminal apparatus through said communication means **(work order 166 is transmitted electronically to a handheld device 168 associated with specific maintenance personnel assigned to carry out the maintenance; work order 166 is sent electronically to appropriate maintenance personnel that contains all of the**

critical operating data required to effectively schedule and carry out the maintenance) [Column 17, lines 5-9, 21-27]; and

(c) said anomaly handling terminal apparatus performs anomaly handling for said construction machine at which said anomaly occurred, based on said transmitted anomaly information **(management report can advise the person or entity that owns or operates the asset 31; carrying out said work order to maintain the asset)** [Column 11, lines 42-44; Claim 9].

As per claim 29, Melby et al. teaches the work machine management system according to any one of claims 25-27, wherein:

(a) an anomaly handling terminal apparatus **(handheld device 168)** provided on the end where anomaly handling is performed for a construction machine at which an anomaly has occurred, and said main work machine are corrected by communication means to make reciprocal communications possible **(handheld device 168 is in real-time two way communication with analysis controller database 78)** [Column 17, lines 25-27];

(b) said main work machine transmits said anomaly information **(fault code)** to said anomaly handling terminal apparatus through said communication means **(work order 166 is transmitted electronically to a handheld device 168 associated with specific maintenance personnel assigned to carry out the maintenance; work order 166 is sent electronically to appropriate maintenance personnel that**

contains all of the critical operating data required to effectively schedule and carry out the maintenance) [Column 17, lines 5-9, 21-27]; and

(c) said anomaly handling terminal apparatus performs anomaly handling for said construction machine at which said anomaly occurred, based on said transmitted anomaly information **(management report can advise the person or entity that owns or operates the asset 31; carrying out said work order to maintain the asset)** [Column 11, lines 42-44; Claim 9].

As per claim 30, Melby et al. teaches a management system for work machines that perform prescribed work by operation of a plurality of work machines, wherein:

(a) said plurality of work machines is connected by first communication means so as to make reciprocal communications possible [see analysis of claim 1(a) above];

(b) one or a plurality of main work machines out of said plurality of work machines are connected to a server apparatus by second communication means so as to make reciprocal communications possible [see analysis of claim 1(b) above];

(c) work machine information detection means for detecting work machine information are provided in each of said plurality of work machines [see analysis of claim 1(c) above];

(d) a database for storing data for managing said plurality of work machines, and management information production means for producing management information

based on said work machine information and on data stored in said database, are provided at said server apparatus end [see analysis of claim 1(d) above];

(e) in conjunction with work progress of said plurality of work machines, work machine information is detected by said work machine information detection means provided in said plurality of work machines, and said work machine information so detected is transmitted to said main work machine or machines through said first communication means [see analysis of claim 1(e) above];

(f) said main work machine or machines transmit said transmitted work machine information to said server apparatus through said second communication means [see analysis of claim 1(f) above];

(g) said server apparatus produces management information based on said transmitted work machine information and on data stored in said database, and transmits management information so produced to said main work machine or machines through said second communication means [see analysis of claim 1(g) above];

(h) said main work machine or machines manage said plurality of work machines based on said transmitted management information [see analysis of claim 1(h) above];

(i) judgment means are provided in said main work machine for judging whether communications are possible or impossible by said second communication means between said main work machine and said server apparatus **(receiver 35 can send out a query signal on a predetermined basis to be received by he receiver 35**

when the two units 32 and 35 are sufficiently close to communicate reliably with one another) [Column 7, lines 38-53]; and

(j) when it is judged by said judgment means that communications by said second communications means are impossible, latest management information received by said main work machine via said second communication means and latest work machine information received by said main work machine via said first communication means are stored in memory by said main work machine **(sensed operating conditions of the forklifts 31 are preferably stored in a memory of the data acquisition device 32 for subsequent communication to a remote analysis system)** until it is judged by said judgment means that communications by said second communication means have become possible [Column 6, line 65 – Column 7, line 1].

As per claim 31, Melby et al. teaches a work machine management system for work machines that perform prescribed work by operation of a plurality of work machines, wherein:

(a) said plurality of work machines is connected by first communication means so as to make reciprocal communications possible [see analysis of claim 1(a) above];

(b) one or a plurality of main work machines out of said plurality of work machines are connected to a server apparatus by second communication means so as to make reciprocal communications possible [see analysis of claim 1(b) above];

(c) work machine information detection means for detecting work machine information are provided in each of said plurality of work machines [see analysis of claim 1(c) above];

(d) a database for storing managing data is provided at said management system end for managing said plurality of work machines, and management information production software for producing management information based on said work machine information and on data stored in said database, are provided at said server apparatus end [see analysis of claim 1(d) above];

(e) said management system, when said main work machine is determined, transmits managing data stored in said database and said management information production software to said main work machine through said second communication means [see analysis of claim 1(g) above];

(f) in conjunction with work progress of said plurality of work machines, work machine information is detected by said work machine information detection means provided in said plurality of work machines, and said work machine information so detected is transmitted to said main work machine or machines through said first communication means [see analysis of claim 1(e) above];

(g) said main work machine produces management information, based on work machine information transmitted from said plurality of work machines through said first communication means, and on managing data and management information production software transmitted from said management system through said second communication means [see analysis of claim 1(g) above], manages said plurality of

work machines, based on said management information so produced [see analysis of claim 1(h) above], updates said managing data, and transmits said managing data so updated to said management system, by said second communication means, every time a certain time period elapses **(receiver 35 is connected to local controller 36 and is programmed to periodically transmit the information stored therein to the remote analysis system 50 for analysis;** [Column 8, lines 23-25]; and

(h) said management system updates content stored in said database using those transmitted managing data **(data in the form of new commands, program updates, instructions, and the like can be sent to the data acquisition unit 32 from the receiver 35)** [Column 7, lines 54-61].

As per claim 32, Melby et al. teaches a work machine management system for work machines that perform prescribed work by operation of a plurality of work machines, wherein:

(a) said plurality of work machines is connected by first communication means so as to make reciprocal communications possible [see analysis of claim 1(a) above]'

(b) one or a plurality of main work machines out of said plurality of work machines are connected to the management system **(remote analysis system 50)** by second communication means so as to make reciprocal communications possible [see analysis of claim 1(b) above];

(c) work machine information detection means for detecting work machine information are provided in each of said plurality of work machines [see analysis of claim 1(c) above];

(d) a database for storing data for managing said plurality of work machines, and management information production software for producing management information based on said managing data and work machine information, is provided at said management system end [see analysis of claim 1(d) above];

(e) when said main work machine is determined, managing data **(operational characteristics of the particular asset 11 being tracked, such as the physical requirements or limitations of the asset (mast height, load capacity, types of tires, for example), the type of fuel used, and the period of time or usage between the performance of periodic maintenance; time duration of use (and non-use), distances traveled, the extent of fork usage, the nature of hydraulic system utilization, and the like)** stored in said database **(analysis controller database 78)** and said management information production software are written to said main work machine **(data acquisition device 32 is provided on each of the forklifts 31 for sensing and storing one or more characteristics of the associated forklift)** [Column 4, lines 34-44, Column 6, lines 48-50, 52-63];

(f) in conjunction with work progress of said plurality of work machines, work machine information is detected by said work machine information detection means provided in said plurality of work machines, and said work machine information so

detected is transmitted to said main work machine through said first communication means [see analysis of claim 1(e) above];

(g) said main work machine produces management information, based on work machine information transmitted from said plurality of work machines by said first communication means, and on said managing data and management information production software that were written [see analysis of claim 1(g) above], manages said plurality of work machines, based on said management information so produced [see analysis of claim 1(h) above], and updates said managing data **(receiver 35 is connected to local controller 36 and is programmed to periodically transmit the information stored therein to the remote analysis system 50 for analysis;** [Column 8, lines 23-25]; and

(h) content stored in database in said management system is updated by writing said updated managing data to said management system **(data in the form of new commands, program updates, instructions, and the like can be sent to the data acquisition unit 32 from the receiver 35)** [Column 7, lines 54-61].

Claim Rejections - 35 USC § 103

7. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melby et al. (U.S Patent 6,952,680).

As per claim 17, Melby et al. does not explicitly teach the work machine management system according to claim 1, wherein:

(a) an information display for displaying information toward outside of work site where said plurality of work machines is operating is provided in one or more of said plurality of work machines;

(b) said server apparatus produces information relating to said work site, based on work machine information, transmitted and on data stored in said database, and transmits said information relating to said work site so produced to said main work machine through said second communication means; and

(c) said main work machine displays said information relating to said work site so transmitted on said information display.

However, Official Notice is taken that it is old and well known in the arts to notify relevant parties of the status and availability (or unavailability) of work machines at a site; therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the teachings of Melby et al. to include an information display at a work site so that appropriate personnel can be notified of a need to procure replacement work machines, obtain a work order, or to reconfigure a work schedule to compensate for the status of a work machine on which a main work machine is dependent on to perform work.

As per claim 18, Melby et al. teaches the work machine management system according to claim 17, wherein:

(a) said information display is deployed on a work machine other than said main work machine **(handheld device 168)**; and

(b) said main work machine transmits transmitted information relating to said work site to another work machine through said first communication means **(each of the forklifts 31 is further provided with a transmitter 33 or other communications system for transmitting the acquired data from the data acquisition device 32 to the remote analysis system 50 for analysis)** and causes said information to be displayed on said information display deployed on said other work machine **(handheld device 168 is in real-time two way communication with analysis controller database, thus, dealer billing systems, inventory listings, customer work order approval records, fleet management information can be accessed by handheld device 168; handheld device 168 is used to update database 78 including labor information and an identification of any parts required to effect a repair)** [Column 7, lines 5-8, 14-27, 38-39].

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Mowery et al. (U.S Patent #5,983,198) teaches a system for monitoring use of materials, controlling and monitoring delivery of materials and providing automated billing of delivered materials. Based on material usage, an optimized delivery route and delivery amount to determined to transmitted to delivery trucks.

Quist et al. (U.S Patet #6,199,018) teaches a distributed diagnostic system. A plurality of local monitoring devices collect local information concerning various machines and process that information, according to redefined diagnostic parameters. The local information collected is provided to a global processor in order to process the collected information to provide updated diagnostic parameters to the local monitoring devices.

Bjornson (U.S Patent #6,505,145) teaches an apparatus and method for monitoring and maintaining plant equipment. A computer system implements a process for gathering, synthesizing and analyzing data. Data indicating the current state of the equipment is gathered. Visual images of failure modes are provided to the user to ensure that proper and accurate data are obtained.

Tadokoro et al. (U.S Patent #6,463,352) teaches a system for management of cutting machines. Controlling software components for cutting machines can be placed on any convenient processor on a network. Virtual machine components handle the

collection of data from cutting machines, while a machine monitor component collects data from the virtual machine components. Cutting elements may be tracked for lifetime and for replacement reasons and other commentary data.

Klimasauskas (U.S Patent #6,110,214) teaches an analyzer for modeling and optimizing maintenance operations. The system collects continuous input/output variables into a file, and the optimize determines the time and type of maintenance activities which are to be executed. Potential modifications to process variables are determined to improve the current performance of the processing equipment.

Steve Sturgess' "High-Tech Trucks Forecast the Future" (reference 1-U) teaches that on-board electronics are used to monitor usage, detect malfunctions, and perform self-diagnostics. This information is centralized on display panels, which also have status displays. These systems store historical details of the truck and its systems by combining on-board self-diagnostics and satellite or cellular communications.

Gene Schwind's "New Lift Trucks Do Everything But Drive Themselves" (reference 1-V) teaches that microprocessors are being used both in direct control of trucks and also in recording/dialog/diagnostic functions as well. Built-in diagnostic and monitoring circuits watch over key truck components as well as circuitry. A plurality of truck models have microprocessor monitors that record and control time, data and productivity-related data functions. New controls check out all truck circuitry and

components for the operator, and all information contained in the control system can be accessed and printed out. Built-in real-time clocks are included for the accuracy of record-keeping, and circuitry can handle any kind of sensor input.

Frank Oliveri and Stephen Meiller's "The Value of Truck Dispatch" (reference 1-W) discloses that since 1980, more than 40 mines have implemented some form of computer/radio-based truck dispatching to improve haulage fleet productivity. Modular Mining Systems, Inc.'s DISPATCH system alerts management of problems as they occur. The DISPATCH maintenance utility tracks mine equipment usage and schedules preventative maintenance times. The system logs every hour of operation, including distance traveled, and keeps track of tire performance. Using data collected during normal operation, the system can examine the effect on production in either short or long term planning situations.

John Chadwick's "Hydraulic Excavators" (reference 1-X) discloses that all hydraulic excavator manufacturers offer advanced electronics and computer monitoring systems. Caterpillar offers Vital Information Management System (VIMS), Hitachi offers Electronic Total Control System, O & K Mining offers a new integrated electronic system for control and monitoring, and Demag offers ECS.

Michael Eby and Rick Bush's "Maintenance Management Techniques for the Future" (reference 2-U) teaches that as utilities develop loading histories and

maintenance logs, they can adjust maintenance schedules to more accurately reflect the true operating conditions of the devices, and by tracking maintenance histories and measuring critical indicators of wear or deterioration, utilities can lengthen the life span of systems without adversely affecting reliability.

Walt Moore's "Smart Machines Think for Themselves" (reference 2-V) teaches that trucks that employ multiplexing technology along with the power of the Global Positioning System (GPS) would evolve into "smart machines", machines that can sense the environment around it, analyze the information received, make diagnostic conclusions about the analysis, and then cause a set of reactions to occur. TMS-Drill has developed construction machines approaching that level of intelligence. Caterpillar's Vital Information Management System (VIMS) is exemplary of machine intelligence in its use to monitor health and report this information. VIMS delivers the power of integrated intelligence through a network of sensors and computers that receives and stores machine information. VIMS provides instant reports about abnormal conditions and recommends to the operator what action should be taken. The system also uses its intelligence for self-diagnosis, for storing data about machine operation, and for generating reports that help analyze machine performance. VIMS also has the potential to transmit critical data while the machine is working so that on-line, off-board analysis of data could help technicians make the best judgments about when and how to render needed service.

Graham Lithgoe's "Looking Ahead" (reference 2-W) discloses that the Caterpillar D I I R Carrydozer continually monitors the blade positions, track slip, ground speed, and the angle at which the machine is working. This information is analyzed and used to adjust the positions and pitch of the blade to its optimum positions. New technology will have a major impact on the way mining equipment is designed. The use of electronics will enable equipment managers to communicate with machines to monitor major machine functions and productivity to help identify what needs repairing or replacing, and tell service engineers when key maintenance activities are required. This type of work is being done by systems like Caterpillar's Vital Information Management System (VIMS), an advanced monitoring and diagnostic system that is fitted on all large mining machines. This monitors key machine functions and warns the operator of any faults that develop. A built-in data recorder saves data collected by the recording sensors and can be used to help identify the cause of failures. Rival firms such as Hitachi, Komatsu, and Volvo offer similar devices. Caterpillar is also experimenting with a new system called Advanced Product Services (APS), which is being used to monitor the engines of trucks working all over North America, using satellites to track the locations of each individual truck and transmitting data to computers. Caterpillar is also developing a Computer Aided Earthmoving System (CAES), a computer hardware and software system that gives the machine operator a real time display of the mining or earthmoving task. As work proceeds, CAES measures and records the machine's progress and updates the information to the operator.

"Dashboard Diagnostics" (reference 2-X) discloses that Deere's dashboard incorporates informative uses of on-board data, such as hour-meter reading, engine speed, gear selected, and battery voltage. The monitor can be converted to diagnostic mode, used to display operating values, and indicate output from the transmission input-speed sensor. Deere's monitor will display fault codes and has a continuity checker that tests circuits. A personal computer or hand-held diagnostics tool is required to access the detailed operating history that the on-board computer gathers.

Larry Stewart's "How to Get Value From On-Board Computers" (reference 3-U) discloses that the computers used in today's machines store performance data in their memories, and that information gives service professional specific insight into how operations people use equipment. On-board computers allow equipment managers to objectively evaluate an operator's effect on computer-reliability. The electronic control unit (ECU) delivers information received from sensors. Simple diagnostic tools like dash-mounted units or hand-held models can be used to diagnose faults, and can be used to simplify diagnosing problems.

Kenneth Korane's "Satellites Spur Precision Mining" (reference 3-V) discloses that satellite-base navigation system that tap into the Global Positioning System (GPS) network are used in mining operations to increase efficiency. Wireless communication techniques are used to transfer large amounts of data from machines to a central computer. Caterpillar's Computer-Aided Earthmoving System (CAES) is used to

transmit engineering designs directly to the working machines. With CAES, every machine has a GPS antenna and receiver, computer and monitor, and Windows-compatible software. Data is transmitted to each machine's on-board display via a high-speed radio network. CAES measures and records the machines' progress and transmits the information to the engineering management office for analysis. CAES integrates mine planning and operation, and can monitor the operations of many machines simultaneously, using GPS real-time kinematic receivers, high-resolution on-board computer displays, and a high-speed radio network.

Aaron DeWees and Davis Newcomer's "Sky High Help" (reference 3-W) discloses the use of satellite technology in landfill equipment applications. Caterpillar's Computer Aided Earthmoving System (CAES) helps operators maximize compaction by providing real-time planning and surveying information, using an on-board computer and software, GPS, and data radios. The system continuously surveys the site. Design files are exported from the planning software and transported to the office via Caterpillar's METSmanager software. BOMAG's new BTM 05 Terrameter compaction control and documentation system identifies weak spots in landfill and embankment construction, assessing the entire area and continually measuring material stiffness, deformation, and load-bearing capacity of soil and granular materials. The analog instrument console indicates the current travel speed and actual frequency.

Bob Deierlein's "New Components on the Circuit" (reference 3-X) discloses product offerings at the Great American Truck Show held in September 1999. Freightliner introduced the Columbia, featuring an integrated electronics package that manages vehicle operation. The Columbia also includes Freighliner's Driver Message Center (DMC), a display located in the dash that provides information on vehicle status, fuel use, engine operation, and diagnostics. A standard Data Logging Unit (DLU) automatically records truck data, which can be downloaded using Freightliner's ServiceLink software. Caterpillar introduced an Advanced Diesel Engine Management (ADEM 2000) system for monitoring and improving truck engine performance.

Adriana Potts and Mike Woof's "As Good As It Gets!" (reference 4-U) discloses mining equipment at the 1998 Bauma exhibition of new mining equipment. Aveling Barford's RD44 is fitted with a complete computerized performance monitoring system. The performance monitoring package keeps an eye on all the machine functions and lets the operator know if anything untoward is going on. A single control console with LCD displays tells the truck driver exactly what is happening, and service engineers can download machine performance and diagnostic data for evaluation. Belaz's B-Series 7555 truck features a payload weighing system connected to the on-board computer, which can be linked in with the engine/transmission management system to give the user information on cycle times and overall machine performance. The engine monitoring system keeps a careful watch on oil/water levels and temperatures and can warn the operator of any impending technical problems. The Belaz system is also able

to record data. Liebherr's PR752 dozer continuously monitors maneuverability and traction by the dozer's electronic system. Michelin has introduced MEMS, an intelligent tire system that can continuously monitor inflation pressure and tire temperature against predetermined optimum readings. Volvo's machine monitoring package, called Contronic, tells the operator of any problems that may be developing as well as indicating when the truck needs service attention. Connecting the Contronic monitoring system to the PC-based Matris software package gives customer the chance to analyze operating performance and maintenance status of each machine and look closely at specific components if necessary.

Larry Stewart's "Fleet Efficiency's Future Belongs to Information Managers" (reference 4-V) discloses that the infrastructure necessary to provide unprecedented etail on how machines perform in the field, based on GPS and wireless communications, is being perfected by companies such as Caterpillar and Orbcomm, a satellite communications firm. Several ways to get data (such as fuel use from individual machines, as well as hours of operation and anomalies such as overheating and low oil pressure) from machines to the fleet manager's desk already exist. Global positioning systems can be linked to the machine's on-board controllers to transmit machine performance data to a central computer. Machine status can be transmitted via cellular or two-way radio frequencies, or it can be bounced off the satellite to a central collection computer.

Adriana Potts and Mike Woof's "Showtime!" (reference 4-W) discloses new machinery and new concepts displayed at the 1999 Minetime exhibition. ABB Automation was promoting its advanced central control station technology that allows the whole operating process of a surface mine to be controlled and monitored from a central room, with all information necessary for the operation displayed on screen. The location of machines can be pin-pointed exactly by GPS, and the system can also control fuel consumption and other data from the machines, collecting said information at the control room. The ContiTech Safe System is an on-line monitor that is capable of detecting cuts in the belting using embedded transponders. The station features an antenna that allows the transponders to both receive and transmit data, which is then evaluated in a central processor.

Bristol Voss' "Automatica Haulage" (reference 4-X) discusses Wenco's fleet management and information control system. Mobile data terminals (MDTs) are installed on the equipment, and used along with radio infrastructure and computer software to communicate with the base station through a dedicated radio link. Using GPS, Wenco can track the progress of a truck as it moves throughout the mine. The MDT sends messages via radio to the computer system that a truck has dumped its payload and is available for assignment. The software calculates an assignment and sends it back to the truck operator's display. The system tracks production data and, when integrated with on-board diagnostics, can produce data including maintenance information from on-board condition monitoring systems. The Venetia Mine has

integrated its system with the VIMS system on its Caterpillar fleet so that condition monitoring alarms ring in the control rooms as faults happen. Wenco is used as an analysis tool to record machine locations, and other pertinent information to report productivities to efficiently manage the mine.

Scott Shuey's "Asset Management" (reference 5-U) discloses that active monitoring is the current state of fleet management. Current system take data from virtually every part of the machine, which is routinely downloaded and viewed by manufacturers. Data is collected by on-board computers and the operator receives warning messages providing instructions to avert serious damage. A mine's entire equipment fleet can be wired, with the information downloaded and archived in a central office where vehicle performance can be analyzed for problems. Modern operations have equipment in constant radio communication with office computers on a real-time basis. Information gathered from chips embedded in the tires and sensors on the frame can be used to find additional problems. Integration of basic technologies into a coherent system is being examined by a number of manufacturers including Caterpillar, Komatsu, and Modular Mining Systems, who have products available representing the first steps toward totally automated and predictive maintenance. Caterpillar's Vehicle Information Management System (VIMS) has been available since the end of 1998.

"HITACHI: TRW and Hitachi Align to Offer Production Control Systems Software to Global Automotive Clients" (reference 5-V) discusses NXAUTO, a real-time,

manufacturing execution system package. NXAUTO manages the vehicle information and tracks each vehicle on a real-time basis, providing work instructions to the operators on the shop floor as well as the machines that are used in production. NXAUTO further provides necessary production information for the managers to aid in critical decision-making.

"The Smart Mine" (reference 5-W) discusses Caterpillar's Computer Aided Earthmoving System (CAES) and Aquila drilling packgages, which provide a tremendous amount of operating data. Onboard machine health and production management systems have been integrated into Caterpillar machines since 1994.

John Chadwich's "Earthmoving Tomorrow" (reference 5-X) discusses technology products from supplies such as Caterpillar (through its CAES, VVIMS and other systems, like MineStar), Modular Mining and Wemco. Computerized management systems are being used to optimize fleet assignments and to provide accurate reporting. This new technology includes precise equipment guidance systems using GPS, and broader use of telemetry systems for vehicle tracking, maintenance monitoring and diagnostics systems. Bucyrus uses a Remote Knowledge Network (RKN) system to transmit machine operating alerts. Designed to operate on a standard Ehternet network, the RKN offers instant communication capabilities to provide data to assist personnel in analysis. Komatsu has introduced the Vehicle Health Monitoring System (VHMS) which provides a wide selection of data to reduce the potential of an unexpected malfunction.

Cummins engines' electronic management systems can be enhanced with Cense electronics to provide highly detailed information about engine performance. It monitors 39 engine parameters and reviews data. Cense transmits data and fault warnings via mine dispatch systems and can also download data automatically by short-range RF links. The truck fleet at Grootegeluk is controlled by a computerized dispatch system, where full computerized records of each truck are instantly available. The Contronic II electronic monitoring system monitors conditions and diagnoses faults on onboard systems, while the Haultronic II load-weighing system measures and records distances, cycle time and cycle counts.

Komatsu Ltd's "Komtrax: The Challenge of Managing Machines" (reference 6-U) discloses a system for managing equipment in the field by knowing the location and status of equipment through GPS, monitoring equipment with a multifunctional transmitting unit installed on each machine, collecting trending information for the operating patterns of machines, and specifying options such as how often the system updates the positioning and service hour meter information.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter Choi whose telephone number is (571) 272 6971. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq Hafiz can be reached on (571) 272-6729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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PC

December 12, 2005

Peter Choi
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